2.1 Information and Its Role in Business

the role of information systems is to transform data, the raw facts, into information, that adds to our knowledge. Distinction Between Data and Information

Information is an increment in knowledge: it contributes to the general framework of concepts and facts that we know. Information relies on the context and the recipient's general knowledge for its significance.

Data are only the raw facts, the material for obtaining information. Information systems use data stored in computer databases to provide needed information. A database is an organized collection of interrelated data reflecting a major aspect of a firm's activities.

1. Information systems capture data from the organization (internal data) and its environment (external data).

2. They store the database items over an extensive period of time.

3. When specific information is needed, the appropriate data items are manipulated as necessary, and the user receives the resulting information.

4. Depending on the type of information system, the information output may take the form a query response, decision outcome, expert-system advice, transaction document, or a report.

Formal information systems rely on procedures (established and accepted by organizational practice) for collecting, storing, manipulating, and accessing data in order to obtain information. Formal systems do not have to be computerized, but today they usually are. Informal information systems also exist within an organization (interpersonal networking, water cooler gossip, etc.).

Attributes of Quality Information

Quality information needs to possess several attributes. Notably, it has to be:

1. Timely Available when needed and not outdated when made available

2. Complete Includes all the user needs to know about the situation where the information will be used

3. Concise Does not include elements unneeded by the user

4. Relevant Has direct bearing on the situation

5. Precise Offers quantitative information with a degree of exactness appropriate to the underlying data

6. Form The level of detail, tabular versus graphic display, and quantitative versus qualitative form are selected in accordance with the situation Internal and External Information

Most of the data captured by information systems relates to the operations of the organization itself, serving to produce internal information. But in an increasingly competitive marketplace, a firm needs to access more and more external information. Therefore, it is important to note that decision makers need both the internal information about their organization and the external information about its environment.

A firm can succeed only by adapting itself to the demands of its external environment. The environment is represented by a number of groups that affect the company's ability to achieve its objectives or that is affected by it. Such groups are called the stakeholders of a firm, which includes both internal and external stakeholders.

2.2 Systems

An information system is a specific type of system in general. A system is a set of components (subsystems) that operate together to achieve certain objectives. The objectives of a system are realized in its outputs. In particular, the objective of an information system is to provide the appropriate outputs to the members of the organization.

Effectiveness and Efficiency

An organization is an example of an artificial system: it is a formal social unit devoted to the attainment of specific goals. It does not emerge naturally - it has to be organized.

The quality of the system may be evaluated in terms of its effectiveness and efficiency. Effectiveness measures the extent to which the system meets its objectives. Efficiency is a measure of resources consumed to produce given outputs. The fewer resources a system consumes in producing given outputs, the more efficient it is.

Information Systems in the Feedback Loop of an Organization

All organizations exist as part of a larger system. Information systems are used to assist management by providing feedback on the firm's performance. Feedback refers to the outputs of a system that are transformed back into inputs in order to control the system's operation. Information systems are used to compare the data on the actual performance with the standards developed earlier. Based on the information about the discrepancies, managers can formulate corrective actions, which are then fed back into the firm's operations.

2.3 Components of Information Systems

Information systems consist of the following general components:

1. Hardware

2. Software

3. Databases

4. Human resources

5. Procedures

Hardware

Multiple computer systems: microcomputers, minicomputers, mainframes, together with their peripherals. Computer system components are: a central processor(s), memory hierarchy, input and output devices.

Computer processor: The central processor carries out the instructions of a program, translated into a simple form.

Memories: Included in a computer system form a hierarchy. They range from the fast electronic units, such as the main memory, to the slower secondary storage devices such as magnetic disks.

Moore's Law The increases in the number of transistors on chips correspond to the increase in the microprocessor speed and memory capacity, and thus the growth of the processing power.

Downsizing In information systems, transferring some or all of the organization;s computing from centralized processing on mainframes or minicomputers to systems built around networked microcomputers (often in a client/server configuration).

Software

Computer software falls into two classes: systems software and applications software.

Systems Software: Manage the resources of the computer system and simplifies programming. An operating system is the principal system software. It manages all the resources of a computer system and provides an interface through which the system's user can deploy these resources.

Application Software: Are programs that directly assist end users in doing their work. They are purchased as ready-to-use packages. Applications software directly assists end users in doing their work.

Databases

Databases are organized collections of interrelated data used by applications software. Databases are managed by systems software known as database management systems (DBMS) and shared by multiple applications.

Telecommunications

Telecommunications are the means of electronic transmission of information over distances. Today, computer systems are usually interconnected into telecommunications networks. Various network configurations are possible, depending upon an organization's need. These include:

1. Local area networks (LAN) 2. Metropolitan area networks (MAN) 3. Wide area networks (WAN)

A Network Information System: Three-Tier Architecture:

Mainframe computer as the top-level machine

2. Several minicomputers or powerful microcomputers in the middle level.

3. End -users in the third tier.

A Downsized Networked Information System: Client/Server Architecture:

1. Users' microcomputers (clients) share the more powerful machines (servers)

2. Each server is dedicated to a particular task i.e., it is providing a certain service

3. The client machines provide the user interface that makes it easy to use the facilities of the network.

4. When needed, the software running on the client calls remotely upon the software running on the server to perform its task, to access the specified data from a database.

Systems Architecture for Remote Access from Virtual Offices:

Human Resources

Professional information systems personnel include development and maintenance managers, systems analysts, programmers, and operators, often with highly specialized skills.

End users are the people who use information systems or their information outputs, that is, the majority of people in today's organizations. The hallmark of the present stage in organizational computing is the involvement of end users in the development of information systems. End-user computing, or control of their information systems by end users and the development of systems by end users, has become an important contributor to information systems in organizations.

Procedures

Procedures are the policies and methods to be followed in using, operating, and maintaining an information system. Specifications for the use, operation, and maintenance of information systems, collected in help facilities, user manuals, operator manuals, and similar documents, frequently delivered in an electronic form.

2.4 Types of Information Systems

Organizations employ several types of information systems. These include:

1. Transaction Processing Systems (TPS)

2. Management Reporting Systems (MRS)

3. Decision Support Systems (DSS)

4. Executive Information Systems (ESS)

5. Office Information Systems (OIS)

6. Professional Support Systems

Transaction Processing Systems

Transaction processing systems today generally work in on-line mode by immediately processing a firm's business transactions. A Transaction is an elementary activity conducted during business operations.

TPS may work either in batch mode, processing accumulated transactions at a single time later on, or in on-line mode, processing incoming transactions immediately. Today, most TPS work in the on-line mode.

Management Reporting Systems

The objective of management reporting systems is to provide routine information to managers. Managers receive performance reports within their specific areas of responsibility. Generally, these reports provide internal information rather than spanning corporate boundaries. They report on the past and the present, rather than projecting the future.

In order to prevent information overloads, managers may resort to using demand or exception reports. Demand reports are requested when needed. Exception reports are produced only when preestablished out-of-bounds conditions occur and contain only the information regarding these conditions.

Decision Support Systems

the structure of a decision support system. Decision support systems directly support a decision-making session. These systems facilitate a dialog between the user, who is considering alternative problem solutions, and the system that provides built-in models and access to databases. The DSS databases are often extracts from the general databases of the enterprise or from external databases.

Executive Information Systems

Executive information systems support top managers with conveniently displayed summarized information, customized for them. They make a variety of internal and external information readily available in a highly summarized and convenient form. EIS are used to:

1. Monitor the performance of the organization

2. Assess the business environment

3. Develop strategic directions for the company's future

Office Information Systems

The main objective of OIS is to facilitate communication between the members of an organization and between the organization and its environment. OIS are used to:

1. Help manage documents represented in an electronic format

2. Handle messages, such as electronic mail, facsimile, and voice mail

3. Facilitate teleconferencing and electronic meetings

4. Facilitate the use of the Internet for communication and access to information

5. Facilitate the use of task-oriented teams through the use of groupware

Professional Support Systems

Professional support systems help in tasks specific to various professions. As both organizational and individual experience with information systems grow, more and more specialized categories of professional support systems emerge.

Expert Systems in Information Systems

Expert systems are system that employs knowledge about its application domain and uses an inferencing (reason) procedure to solve problems that would otherwise require human competence or expertise. The essential component of the knowledge base is heuristics - informal, judgemental elements of knowledge within the expert system's domain, such as oil exploration or stock valuation. The knowledge base is developed by working with domain specialists. It is further enhanced as the system is used.

2.5 Supporting Managers with Information Systems:

A variety of information systems support managers as they play their interpersonal, informational, and decisional roles. The three management-oriented types of systems (management reporting systems, decision support systems, and executive information systems) provide different kinds of support to the three levels of management:

1. Strategic

2. Tactical

3. Operational

What Managers Do and How Information Systems Can Help

The fundamental functions of management include:

1. Planning establishing goals and selecting the actions needed to achieve them over a specific period of time.

2. Controlling measuring performance against the planned objectives and initiating corrective action, if needed.

3. Leadership including the people in the organization to contribute to its goals.

4. Organizing establishing and staffing an organizational structure for performing business activities.

Mintzberg classified all managerial activities into ten roles falling into three categories:

1. Interpersonal Role

2. Informational Role

3. Decisional Role

Information Systems for Management Support:

The objectives of the three levels of corporate management are:

1. Operations Management: performed by supervisors of smaller work units concerned with planning and control of short-term (typically, a week or six months) budgets and schedules.

2. Tactical Management: performed by middle managers responsible for acquisition and allocation of resources for projects according to tactical plans, set out for one or two years.

3. Strategic Management: Carried out by top corporate executives and corporate boards responsible for setting and monitoring long-term directions for the firm for three or more years into the future.

2.2 Information System (IS) and Information Technology (IT) Information systems (IS) and information technologies (IT) are a vital component of successful businesses and organisations (O'Brien, 2004). The definition of both IS and IT are closely related to each other; however, they are different in their functions. IT relates to the products, methods, inventions, and standards that are used for the purpose of producing information. It can also be defined as "the preparation, collection, transport, retrieval, storage, access, presentation, and transformation of information in all its forms (voice, graphic, text, video, and image). Information movement can take place between humans, humans and machines, and/or between machines. Information management ensures the proper selection, deployment, administration, operation, maintenance, and evolution of the IT assets consistent with organizational goals and objectives" (Boar, 1993, p.3). IT refers to the products, methods, inventions, and standards that are used for the purpose of producing information (Kroenke, 2007). IS "consists of the information technology infrastructure, application systems, and personnel who employ information technology to deliver information and communications services for transaction processing/operations and administration/management of an organisation" (Baskerville, Stage, & DeGross, 2000). Therefore IS is a set of components which interact to produce information, which include hardware, software, data, procedures, and people, whereas these components can be found in every information system (Kroenke, 2007).

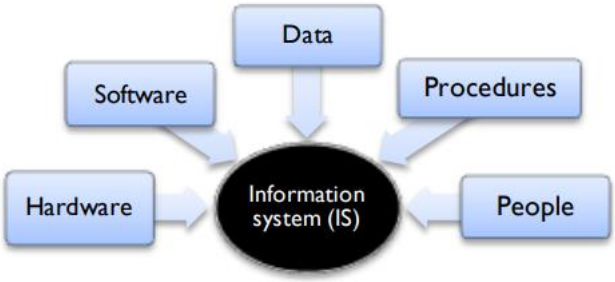

Figure 2.2 Five Components of an Information System (IS) (source: Kroenke, 2007: p. 5)

According to Figure 2.2, the main elements of IS consist of hardware, software, data, procedures, and people. Hardware refers to computers, storage disks, keybords, and communication devices while software is relevant to word-processing programs. Data or information is included texts, words, sentences, and paragraphs in reports. Furthermore, procedures refer to the methods for using the program and involved activities. The last element is people. The important role of the five components is that IS is not only computers, programs, and communication devices, but it also focuses on the assembly of hardware, software, data, procedures, and people; in other words, information system means a system of communication between people (Kroenke, 2007; Davies, 2009). Moreover, Gurbaxani and Whang (1991) claimed that there are many roles of information systems in an organisation, for example to increase an operation's efficiency, to process business transactions, to provide decision support, to monitor and evaluate employees'

performance, and to maintain documentation and communication channels. Information technology (IT; i.e. hardware and sofware) is one significant component in an information system (IS). Nowadays, IT is an important factor to evolve in strategic planning of an organisation. In addition, IT is the asset or capability base on which an enterprise constructs its business information system (Boar, 1993). On the other hand, the main roles of IT have been analysed and presented by Chan (2000). He claimed that the key roles of IT include an initiator, a facilitator, and an enabler. The importance of an initiator in IT is to initiate a new operation, or initiate the change of IT. In addition, a facilitator of IT is a tool which helps to manage work which is easier to work. Finally, an enabler of IT offers the ability or the necessary support to achieve a goal.

Figure 2.2 Five Components of an Information System (IS) (source: Kroenke, 2007: p. 5)
Organisations have radically changed their IT strategies and one of the strategies that they choose is to purchase standard package software instead of developing IT systems in-house